

505-41-37

## EOSDIS Core System Project

# Interface Control Document Between EOSDIS Core System (ECS) and the Spacecraft Software Development and Validation Facilities (SDVF)

March 1996



National Aeronautics and  
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Goddard Space Flight Center  
Greenbelt, Maryland

INTERFACE CONTROL DOCUMENT  
between the  
EOSDIS Core System (ECS) and the  
Spacecraft Software Development  
and Validation Facilities (SDVF)

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## Preface

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This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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## Abstract

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This Interface Control Document (ICD) defines the interface between the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) and the Spacecraft Software Development and Validation Facilities. This document describes the contents, format, and data exchange methods for this interface.

This ICD is consistent with the Functional and Performance Requirements Specification for ECS (Level 3 requirements), the ECS/AM-1 interface requirements, as described in the ECS Statement of Work (SOW), and the Interface Requirement Document (IRD) Between ECS and the EOS-AM Project for AM-1 Flight Operations.

**Keywords:** SDVF, AM-1, EOC, ICD, SDF, FSTB, Code 582, PDB, DFCD

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# 1. Introduction

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## 1.1 Identification

This Interface Control Document (ICD), Contract Data Requirement List (CDRL) item 029, whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS), Contract NAS5-60000.

## 1.2 Scope

This ICD provides definition for the system interfaces that exist between ECS and the Software Development and Validation Facilities (SDVF). For the EOS AM-1 mission, the SDVF function initially is performed by the AM-1 Software Development Facility (SDF), located at the AM-1 spacecraft vendor's facility in Valley Forge, PA. After AM-1 launch, the SDVF function transfers to the Goddard Space Flight Center (GSFC) Flight Software Systems Branch (Code 512) AM-1 Flight Software Test Bed (FSTB), at a time determined by the AM Project. This ICD covers the ECS interfaces to both the AM-1 SDF and the Code 512 FSTB.

This document is intended to define and control the external interfaces between FOS and SDVF software. The FOS Operations Tools Manual provides detailed information on the capabilities and operation of FOS software at the EOC and the IST. This document is not intended to duplicate or supersede the information provided in the FOS Operations Tools Manual.

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The Earth Science Data and Information System (ESDIS) Project has joint responsibility with the AM Project and the Flight Software Systems Branch for the development and maintenance of this ICD. Any changes in the interface must be agreed to by the relevant participating parties, and then assessed at the ESDIS Project Level. This ICD will be approved under the signatures of the ESDIS and the AM Project Managers and the Flight Software Systems Branch Head.

ECS Releases are keyed to mission support: Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 mission. Releases C & D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

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This document reflects the August 23, 1995 Technical Baseline maintained by the contractor configuration control board in accordance with ECS Technical Direction No. 11, dated December 6, 1994.

### 1.3 Purpose and Objectives

This ICD is written to formalize the interpretation and general understanding of the ECS/SDVF interface. This document provides clarification and elaboration of the ECS/SDVF interfaces to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control of these interface definitions for the ESDIS Configuration Control Board (CCB) and the CCB(s) serving the AM Project and the Flight Software Systems Branch.

### 1.4 Status and Schedule

This ICD is delivered for review and approval as a CCB approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted at any time for consideration by Contractor and Government CCBs under the normal change process.

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### 1.5 Organization

This document is organized in 5 sections plus appendices. Section 2 contains information about documentation relevant to this ICD, including parent, applicable, and information documents. Section 3 provides an overview of the ECS/SDVF interfaces. Section 4 provides an overview of the data exchange framework. Section 5 contains a description of ECS/SDVF data flows, including data format and content, the data transfer method(s), and error handling. Appendix A contains definition of ASCII table load files.

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## 2. Related Documentation

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### 2.1 Parent Documents

The following documents are the parents from which this document's scope and content are derived.

193-208-SE1-001	Methodology for Definition of External Interfaces for the ECS Project
304-CD-001-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 1: General Requirements
304-CD-004-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 2: AM-1 Mission Specific
423-41-01	Goddard Space Flight Center, EOSDIS Core System Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System
505-41-15	Goddard Space Flight Center, Interface Requirements Document Between ECS and EOS-AM Project for AM-1 Flight Operations
none	Goddard Space Flight Center, Inter-project Agreement Between AM and ESDIS Projects on Flight Operations for the AM-1 Spacecraft
none	Memorandum of Understanding (MOU) Between the Earth Observing System AM Project and the Flight Software Systems Branch for EOS AM Spacecraft Bus Flight Software Maintenance

### 2.2 Applicable Documents

The following documents are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this document, this document shall take precedence.

505-10-35-1	Data Format Control Document for the Earth Observing System (EOS) Flight Operations Segment (FOS) Project Data Base, Volume 1: Generic	CH01
		CH02
505-10-35-2	Data Format Control Document for the Earth Observing System (EOS) Flight Operations Segment (FOS) Project Data Base, Volume 2: AM-1 Mission	CH02
305-CD-003-002	Communications and Systems Management Segment (CSMS) Design Specification for the ECS Project	

305-CD-040-001	Flight Operations Segment (FOS) Design Specification for the ECS Project (Segment Level Design)	
305-CD-048-001	Flight Operations Segment (FOS) User Interface Design Specification for the ECS Project	
343-TP-001-001	Instrument Support Terminal Toolkit (IST) Capabilities Document for the ECS Project	
540-031	Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the EOS Operations Center (EOC)	
540-094	Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the Flight Software Testbed (FSTB)	CH02
540-096	Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the AM-1 Software Development Facility (SDF)	
ICD-106	Martin Marietta Corporation, Interface Control Document (ICD) Data Format Control Book for EOS-AM Spacecraft	
RFC791	Internet Protocol, J. Postel	
RFC793	Transmission Control Protocol, J. Postel	
RFC959	File Transfer Protocol, Internet Standards, J. Postel, J. Reynolds	
RFC1510	Deleted	CH02

## 2.3 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding.

194-201-SE1-001	EOSDIS Core System Project, Systems Engineering Plan for the ECS Project	
194-202-SE1-001	EOSDIS Core System Project, Standards and Procedures for the ECS Project	
ISO 7498	International Organization for Standardization, Basic Reference Model for Systems Interconnection	
609-CD-005-003	Flight Operations Segment (FOS) Operations Tools Manual	CH03
none	Jamsa Press, Nevada; Internet Programming, K. Jamsa, Ph.D. and K. Cope, 1995	

## 3. Interface Overview

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### 3.1 Interface Context

Spacecraft flight software updates occur on an infrequent basis throughout the life of the mission. The EOS Operations Center (EOC), which is an element of the ECS Flight Operations Segment (FOS), interfaces with SDVFs to receive flight software load contents files for uplink to the spacecraft and to send flight software dump files to the SDVFs. The EOC, located at the Goddard Space Flight Center (GSFC) Building 32, is the focal point for maintaining EOS spacecraft and instrument health and safety, including the periodic uplink/downlink of flight software and flight software tables.

During the AM-1 mission, the SDVF function is first performed by the Software Development Facility (SDF), located at the AM-1 spacecraft vendor's facility in Valley Forge, PA. At a time determined by the AM Project, the SDVF function transfers to the Code 512 Flight Software Test Bed (FSTB), at GSFC Building 1. For the AM-1 mission, the EOC receives loads from one SDVF facility at a time (the SDF or the Code 582 FSTB). There is no difference in functionality between these two facilities.

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The AM-1 SDVFs contain flight software development tools and flight software diagnostic tools. The SDVF generates spacecraft flight software loads and flight software table updates. Flight software loads and flight software tables are provided to the EOC from the SDVF for uplink to the AM-1 spacecraft. Flight software load instructions may include a request for a flight software dump from the spacecraft after uplink has been completed. Note that a request for a flight software dump from the spacecraft may be coordinated with the EOC FOT independently from a flight software load request.

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### 3.2 EOC/SDVF Interface

The SDVF prepares the flight software load contents files for delivery to ECS and receives flight software dump files from ECS. The ECS Instrument Support Terminal (IST) Toolkit is also used by the SDVF to perform sustaining engineering activities as well as to serve as the application interface for transferring flight software loads and dumps to and from the EOC. The ECS IST Toolkit provides a subset of EOC capabilities and is documented in the Flight Operations Segment Design Specification for the ECS Project. See Applicable Document 343-TP-001-001, the IST Capabilities Document, for more information. The interface between the ECS IST Toolkit and the EOC is an ECS-internal interface and is documented in the Flight Operations Segment Design Specification for the ECS Project.

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The host computer for the ECS IST Toolkit is provided by the SDVF. The ECS IST Toolkit imports formatted flight software load contents files from the SDVF's ECS IST Toolkit host computer and exports formatted flight software dump files to the SDVF's ECS IST Toolkit host computer. Network connectivity between the EOC and the SDVF's ECS IST host computer is provided by the EOSDIS Backbone Network (EBnet).

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Through the use of the IST, the FOS allows an IST user to ingest, validate, generate and schedule loads for uplink to the spacecraft and instruments. The IST user would normally use the load builder tools to create RTS and Table loads via the FOS User Interface. The IST user can also ingest ASCII Relative Time Sequence (RTS) load files and binary memory load files. Refer to Section 5.1 for the format of the ASCII RTS Flight Software Table Load contents ingest files and Binary Flight Software Image Load contents ingest files. Apart from using the IST, the SDVF user can also create an ASCII Flight Software Table Load contents file that can be FTP'd to the EOC for automatic ingest. (Refer to Section 5.2.2.3)

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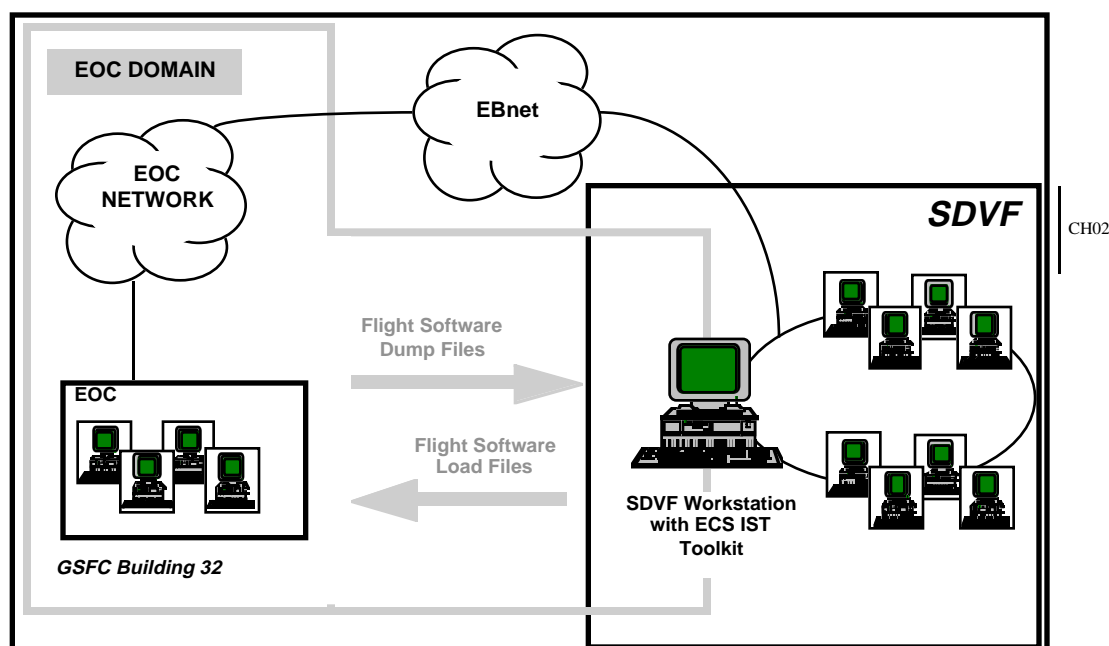
The FOS IST load tools consist of Binary Load Builder, RTS Load Builder, and Table Load Builder. The Binary Load Builder ingests Binary Flight Software Image Load contents files from SDVF and generates loads. The RTS Load Builder allows the user to ingest RTS Flight Software Table Load contents files (i.e., commands) as ASCII text. The RTS Load Builder ingests RTS Flight Software Table load contents files from SDVF and generates loads. The Table Load Builder allows the user to create a new table load from previously saved contents files (.cnt) or from binary images of flight software tables (including table dumps).

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When a load (i.e., Binary, RTS, Table) is generated, three load files are generated .upl, .img, and .cnt. An entry is logged in the load catalog database table and an ASCII load report is generated. The IST user can view the load report via the Report Browser Tool. The .upl file is the uplink file to the spacecraft. The .img file is used as a ground reference for the FOT. The .cnt file is the load contents file used internally by FOS software. The .cnt file is kept in the load directory at SDVF IST.

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Figure 3-1 provides a top-level view of the ECS/SDVF interface.



**Figure 3-1. ECS/SDVF Interface Overview**

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***Figure 3-2. ECS/FSTB Interface Overview  
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## 4. Data Exchange Framework

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Section 4 describes the data exchange framework supporting the ECS/SDVF interfaces. The data exchange framework is used for ECS/SDVF data flows which are described in Section 5. The description includes network interfaces, electronic data exchange protocols, physical data exchange, and data exchange security.

### 4.1 Physical Network Topology

Figures 3-1 and 3-2 give an overview of the EOC/SDF and EOC/FSTB physical interfaces. The CSMS Design Specification for the ECS Project describes the topology of ECS local networks (e.g., the EOC LAN), including ECS's connectivity with the EBnet. EBnet has developed the following ICDs to describe the details of the EBnet interfaces with the EOC, the SDF, and the FSTB. | CH01

- a. Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the EOS Operations Center (EOC)
- b. Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the AM-1 Software Development Facility

### 4.2 Internetworking Protocols

Internetworking protocols supporting the EOC-ECS IST interface for data exchange between the EOC and the SDVF are documented in the FOS User Interface Design Specification for the ECS Project. | CH01  
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#### 4.2.1 Internet Protocol

The Internet Protocol (IP), specified in RFC791, supports network layer data exchanges between the EOC and the SDVF. The network layer provides the transparent transfer of data between transport entities. EOC IP addresses for the network nodes and workstations are determined at the time of EOC installation. The SDVF host IP addresses are determined at the time of IST installation. | CH02  
| CH02

### 4.2.2 Transport Protocol

Connection-oriented transport service for the EOC/SDVF interface is implemented using Transport Control Protocol (TCP). TCP, specified in document RFC793, is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. It provides for guaranteed delivery of data between pairs of processors in host computers attached to networks within and outside ECS.

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### 4.2.3 File Transfer Protocol

Data is transferred between the SDVF IST and the EOC using File Transfer Protocol (FTP). File Transfer Protocol (FTP), as described in RFC 959, is an Internet standard for file transfers that supports retrieval of files from a remote server. Both ECS and the SDVF must host FTP software.

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## 4.3 Physical Media (Backup Only)

Physical media is used as backup in the event that a sustained outage in EOC-SDF or EOC-FSTB communications prevents the transfer of files (flight software or flight software dumps) electronically. The physical media for backup transfer of files is 4 millimeter (mm) digital audio tape (DAT). Data files are copied onto DAT using a UNIX “tar” command for creating a “tarfile”, i.e. tape archive file. The same command is used by the SDVF to extract the data files. The DAT media permits an EOC File Server 4mm tape drive to write a 2 Gigabyte (GB) file onto a single DAT volume. Multiple files may be contained on a single tape; individual files are not to be split onto multiple tapes. The FOT at the EOC and SDVF personnel provide any required coordination by voice communication.

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## 4.4 Data Exchange Security

For EOC-to-SDVF IST data exchange, file transfer security is achieved by use of FOS security software, which involves encrypted passwords and hostnames.

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Data exchange security between the EOC and ISTs is covered in FOS Design Specifications (refer to Section 2.2).

## 5. Data Flow Descriptions

### 5.1 Flight Software Load Contents Files

Flight software load contents files are retrieved from the SDVF by the EOC. The purpose of the load contents files is to provide the EOC with flight software to be uplinked to the spacecraft. Load contents files consist of binary images of flight software code, binary images of flight software tables, ASCII flight software tables, or ASCII RTS Flight Software Tables. Only those tables that are defined in the EOC AM-1 Project Data Base (PDB) will be processed by the EOC.

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#### 5.1.1 Flight Software File Format

##### 5.1.1.1 Binary Flight Software Image Load Contents Files

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Flight software load contents file contains the binary data used to fill the user-defined portion of the Load Data (words 2-33) of the Memory Load Command shown in ICD-106, Figure 18.

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The SDVF also provides the following information related to the flight software load:

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- the start address (offset) and the number of words (size) of the load
- the destination of the load (spacecraft and subsystem)
- the file name of the binary Flight Software Image load contents file
- the start and stop times of the uplink window for the load

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The SDVF uses the Load Builder Tool to provide this information to the FOS.

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Based on this information, the FOS builds the Load Initiate command for the specified Remote Terminal (as defined in the PDB), fills in the start address, word count, and the CRC or checksum (as appropriate). FOS creates load partitions as necessary. (Note: The SCC FSW and the CTIU FW is limited by maximum loads of 4096 words.)

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AM1\_FSW\_aaaaaaaaaaaaaaaaaaaaaaaaaaaaa.EXT

where:

- “aaaaaaaaaaaaaaaaaaaaaaaaaaaaa” is user-supplied text identifying the load and having a maximum length of 30 characters.

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- “EXT” is the file extension indicating a file generated externally to the FOS

Example:

AM1\_FSW\_FDIR\_PATCH02.EXT

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### 5.1.1.2 ASCII Flight Software Table Load Contents Files

Flight software table load contents are provided by the SDVF in ASCII format or in Binary format via the IST. The Binary format can consist of previously saved contents files (.cnt) or flight software table dumps. Detailed format for the ASCII Flight Software Table Load is given in Appendix A. In order for the ASCII-to-binary conversion to be performed properly, the flight software table load contents provided by the SDVF must be consistent with the table load formats defined in the PDB Table Field Definition Files and the Table Field Definition Records. Once created according to the specified format, the SDVF IST user must FTP the file to the EOC. Along with this file, the SDVF IST user must FTP the signal file that will be used to inform the EOC that the data file transfer has been completed. The signal contains only the full name of the contents file, and its extensions, in ASCII code. The signal file will have the same name as the data file with an additional extension field that will be set to the ASCII code string “.XFR”. The ASCII Flight Software Table Load contents file will be automatically ingested and a table load is automatically generated.

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The PDB Table Field Definition Files and Table Field Definition Records for the flight software tables are specified by the SDF and provided to the EOC. Initially, the AM Project provides the FSTB with the latest approved flight software table formatting information. Any subsequent updates to the PDB Table Field Definition Files or Table Field Definition Records will be provided to the FSTB by the EOC in the standard format as defined in the DFCD for the EOS AM-1 PDB. The AM-1 PDB is a configuration-controlled database.

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All records within a flight software table load contents file must be in the same format. Each record in a file corresponds to a field in the table definition of the PDB and must terminate with an ASCII new-line character.

Flight software table load contents files adhere to the following file naming convention:

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AM1\_TBL\_TableNamePrefix\_aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa.EXT

where:

- “TableNamePrefix” is equal to a valid Table Name as defined in the PDB,
- “aaaaaaaaaaaaaaaaaaaaaaaaaaaaa” is user-supplied text identifying the table and having a maximum length of 30 characters.
- “EXT” is the file extension indicating a file generated externally to the FOS
- Note: This is not an input for the Table Load Builder tool.

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### 5.1.1.3 ASCII RTS Flight Software Table Load Contents Files

RTS Flight software table load files adhere to the following file naming convention:

AM1\_RTS\_nnn\_sss\_aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

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where:

-“nnn” is the RTS number. The value must be in the range of 1 - 128.

-“sss” is a three-letter instrument or spacecraft subsystems identifier

-“aaaaaaaaaaaaaaaaaaaaaaaaaaaaa” is a user supplied text with a maximum length of 30 characters identifying the load.

Example: AM-1\_RTS\_103\_AST\_ON\_VNIR

-

File Contents:

The file must have 1 to 16 command lines, each consisting of the following elements:

Spacecraft time (00:00:00.000 to 18:12:14.976)

Command Mnemonic

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Parameters(Name<sp>=<sp>Value<sp>Name<sp>=<sp>Value<sp>Name<sp>=<sp>Value...)

-

Note:

Spacecraft time: The format could be either 00:00:00 or 00:00:00.000

Command: The user should enter Command mnemonic

Parameters: The user should provide parameters if there are any. Maximum of 10 Name<sp>=<sp>Value Parameters for a Command.

<sp>:space

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-

Example:

00:00:20.480 AST\_SELECT\_MPSA

00:00:30.720 MOD\_TURN\_ON\_PVLWB\_TO=255

CH03

00:00:20.480 MOD\_HALT\_SM\_MIR\_MTR\_BY=1DIRECTION=0

CH03

### 5.1.2 Flight Software Load Contents File Data Transfer Method

For the SDVF, the capability to transfer the flight software load contents files from the SDVF's ECS IST host to the ECS IST Toolkit software for subsequent transfer to the EOC is included as part of the ECS IST Toolkit functions.

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### 5.1.3 Flight Software Load Contents File Data Transfer Error Handling

Flight software load data exchanges between the EOC and the SDVFs are normally accomplished through electronic file transfer. Errors in the FTP transfer are handled by the FTP protocol identified in Section 4.2.3. If communication is lost or cannot be established, the backup method of transfer is physical media distribution as defined in Section 4.3. The coordination between SDVF and FOT personnel is handled either by voice or the exchange of written instructions.

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## 5.2 Flight Software Dump Files

Flight software dump files are sent from the EOC to the SDVF. The purpose of the dump file is to provide the SDVF with a file containing the flight software dump images and flight software table dump images which were loaded on the spacecraft. The request for a flight software dump file is made by direct request from the SDVF to the EOC FOT. A request for a flight software dump file need not be made with a flight software load request. The coordination between SDVF and FOT personnel is handled either by voice or the exchange of written instructions.

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### 5.2.1 Flight Software Dump File Format and Contents

All flight software dump files transferred from the EOC are manipulated by the EOC prior to transfer to the SDVF. The EOC extracts the binary dump data from the downlinked AM-1 CCSDS telemetry packets prior to transfer to the SDVF. Binary dump data are in 16-bit word format as specified in ICD-106.

The EOC provides both the flight software image dumps and flight software table dumps to the SDVF as binary files (not converted to ASCII by the EOC).

Binary flight software image dump files adhere to the following file naming convention:

AM1\_FSa\_DUMP\_ABSINITb\_yyyydddhhmmss.DMP

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where:

a = 1 or 2 (refers to SCC on spacecraft)

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b = 1 or 2 (refers to dump rate)

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- "DMP" is the file extension indicating a flight software dump file.

Example:

AM1\_FS2\_DUMP\_ABSINIT1\_1997254134534.DMP

- AM1\_CDH\_DUMP\_SCCcINIT\_yyyydddhhmmss.DMP

where:

c = 1 or 2 (refers to SCC on spacecraft)

- “DMP” is the file extension indicating a flight software dump file.

Example:

AM1\_CDH\_DUMP\_SCC2INIT\_1998216120103.DMP

- AM1\_CDH\_DUMP\_SCCcDIINIT\_yyyydddhhmmss.DMP

where:

c - 1 or 2 (refers to SCC on spacecraft)

- “DMP” is the file extension indicating a flight software dump file.

Example:

AM1\_CDH\_DUMP\_SCC1DIINIT\_1998216120103.DMP

- AM1\_CDH\_DUMP\_CTdeABSINIT\_yyyydddhhmmss.DMP

where:

d = 1 or 2 (refers to CTIU on spacecraft)

e = R or P (refers to EEPROM or RAM on spacecraft)

- “DMP” is the file extension indicating a flight software dump file.

Example:

AM1\_CDH\_DUMP\_CT1PABSINIT\_1998216120103.DMP

Flight software table dump files adhere to the following file naming convention:

- AM1\_FSa\_DUMP\_TBLINITf\_yyyydddhhmmss.DMP

where:

a = 1 or 2 (refers to SCC on spacecraft)

f = R or P (refers to dump rate)

- “DMP” is the file extension indicating a flight software table dump file.

Example:

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AM1\_FS2\_DUMP\_TBLINIT2\_1998125234521.DMP

- AM1\_CDH\_DUMP\_CT2RTBLINIT\_yyyymmddhhmmss.DMP

where:

- “DMP” is the file extension indicating a flight software dump file.

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Example:

AM1\_CDH\_DUMP\_CT2RTBLINIT\_1998125234521.DMP

**5.2.2 Flight Software Dump File Data Transfer Method**

For the SDVF, the capability to transfer the flight software dump files from the EOC to the ECS IST Toolkit on the SDVF host is included as part of the ECS IST Toolkit functions. The ECS IST Toolkit provides the capability to export formatted flight software load dump files to the SDVF’s IST host computer.

CH02

CH01, 02

CH02

CH02

**5.2.3 Flight Software Dump File Data Transfer Error Handling**

Flight software dump data exchanges between the EOC and the SDVFs are normally accomplished through electronic file transfer. Errors in the FTP transfer are handled by the FTP protocol identified in Section 4.2.3. If communication is lost or cannot be established, the backup method of transfer is physical media distribution as defined in Section 4.3. The coordination between SDVF and FOT personnel is handled either by voice or the exchange of written instructions.

CH02

## Appendix A. Flight Software Table Loads

CH01, 02

### A-1. Flight Software Table Load File Format

**Header Record:** 128 bytes.

CH02,03

Field Name	Maximum Field Width	Description
Satellite Id	8	The satellite id of the AM1 spacecraft ("AM1").
File Type	14	This field indicates the type of file. The only valid value is "TABLELOAD".
File Creation Time	14	Time when the file was created in the form YYYYDDD.HHMMSS
Table Name	30	The table name as defined in the FOS PDB.
Table Number	4	The unique number identifying this table in the FOS PDB.
Destination	2	RT ID (destination) address of the load data, as defined in AM-1 ICD-106. (Decimal representation of the 5 bit binary RT Address).
Uplink Window Start	14	Start time of the valid uplink window in the form YYYYDDD.HHMMSS. This field contains 0.0 if the table can be uplinked at any time.
Uplink Window Stop	14	Stop time of the valid uplink window in the form YYYYDDD.HHMMSS. This field contains 0.0 if the table can be uplinked at any time.
Operations Window Start	14	Start time of the valid operations window of the table in the form YYYYDDD.HHMMSS. This field contains 0.0 if the table data is valid for all times.
Operations Window Stop	14	Stop time of the valid operations window in the form YYYYDDD.HHMMSS. This field contains 0.0 if the table data is valid for all times.

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**Data Records:** 26 bytes.

CH02,03

Field Name	Maximum Field Width	Description
Table Field Number	4	Unique number which identifies a parameter within a table in the FOS PDB.
Value	22	The new value to be loaded for this parameter.

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## Notes:

1. Partial table loads are supported by the EOC. However, the data records within a single table load file must be contiguous. For example, a partial load of table number 179, field numbers 13 through 16 may be supplied in a single table load file. A partial load of table number 179, field numbers 13-16 and 37-40 must be split into two different files before delivery to the EOC.
2. The Data Records within the Table Load file must appear in ascending Table Field Number order.
3. The parameter values appearing in the data records are classified into four data types.
  - FL Floating point data type (32 bit)
  - IT Integer data type (16 bit)
  - LF Long floating point data type (64 bit)
  - LI Long integer data type (32 bit)
4. If the value does not require the entire field width, the remaining portion of the field is ignored. All data fields within a record are separated by exactly one blank character.

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The ASCII data format for each data type is specified as follows:

Data Type	ASCII Format	Example
FL	SX.XXXXXEsXX. (6 significant digits) S = blank if positive, “-” if negative. s = “+” if the exponent is positive, “-” if negative.	-123.4 -> “-1.23400E+02” followed by 10 blank spaces
IT	SXXXXX. (5 significant digits) S = blank if positive, “-” if negative.	123 -> “ 123” followed by 18 blank spaces
LF	SX.XXXXXXXXXXXEsXX. (11 significant digits) S = blank if positive, “-” if negative. s = “+” if the exponent is positive, “-” if negative.	123.4 -> “ 1.2350000000E+02” followed by 5 blank spaces
LI	SXXXXXXXXXX. (10 significant digits) S = blank if positive, “-” if negative.	123 -> “ 123” followed by 18 blank spaces

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## Appendix B. (Deleted)

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CH02

***Table B-1. Representative List of ASCII Flight Software Tables (1 of 3)***  
**(Deleted)**

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***Table B-1. Representative List of ASCII Flight Software Tables (2 of 3)***  
**(Deleted)**

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***Table B-1. Representative List of ASCII Flight Software Tables (3 of 3)***  
**(Deleted)**

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## Abbreviations and Acronyms

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ASCII	American Standard Code for Information Interchange
CCB	Configuration Control Board
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDR	Critical Design Review
CDRL	Contract Data Requirement List
CSMS	Communications and System Management Segment
DAT	digital audio tape
DCN	Document Change Notice
DFCD	Data Format Control Document
DID	Data Item Description
EBnet	EOSDIS Backbone Network
ECS	EOSDIS Core System
EOC	Earth Operations Center
EOS	EOS Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
F&PRS	Functional and Performance Requirements Specification
FOS	Flight Operations Segment
FOT	Flight Operations Team
FSTB	Flight Software Test Bed
FSW	Flight Software
FTP	file transfer protocol
GSFC	Goddard Space Flight Center
I&T	Integration & Test
ICD	Interface Control Document

IP	Internet Protocol	
IRD	Interface Requirement Document	
IST	Instrument Support Terminal	
KDC	Key Distribution Center	
KFTP	Deleted	CH02
MOU	Memorandum of Understanding	
NASA	National Aeronautics and Space Administration	
OSI	Open Systems Interconnection	
PDB	Project Data Base	
RFC	Request for Comment	
RTS	Relative Time Sequence	CH02
SDF	Software Development Facility	
SDVF	Software Development and Validation Facility	
SOW	Statement of Work	
TAR	tape archive	CH01
TCP	Transport Control Protocol	
TRMM	Deleted	CH02